CHAPTER III

REGULATORY BASIS OF ENVIRONMENTAL QUALITY CONTROL

A. INTRODUCTION

Environmental quality of the Upper Great Lakes Connecting Channels is influenced by major environmental regulations, agreements and programs which have been developed at several governmental levels. The Canadian and United States federal governments, the State of Michigan, the Province of Ontario, and their regulatory agencies have promulgated acts and regulations to protect and enhance the environmental quality of the Great Lakes. Binational agreements at both the federal, state and provincial level have also been made. As a result, an extensive and comprehensive base of legislation and agreements exists to protect environmental quality of the connecting channels.

This chapter provides an overview of existing regulatory and administrative programs which act to protect and enhance the environmental quality of the Upper Great Lakes Connecting Channels. A more extensive review of existing regulatory programs pertinent to these shared waterways is presented in Appendix 3.

1. Binational Agreements

The governments of Canada and the United States have long shared a concern for the environmental quality of the Great Lakes Basin. To confirm their commitment to restore and enhance the water quality of the Great Lakes both federal governments entered into the Great Lakes Water Quality Agreement in 1972 (GLWQA). The GLWQA and its associated Annexes were subsequently amended in 1978, 1985 and 1987. The Agreement contains general and specific objectives to maintain and augment water quality by ensuring the Great Lakes are free from substances resulting from human activity, are unsightly or deleterious, or interfere with beneficial uses of the water. The seventeen Annexes of the GLWQA outline specific objectives and programs aimed at maintaining and

improving the quality of these shared waters. For many parameters, the Annexes provide numerical ambient water quality and fish contaminant objectives, as well as narrative guidelines for other categories of contaminants and discharges. The GLWQA, while outlining objectives which both governments strive to achieve, is an agreement only and has no regulatory authority in and of itself.

Ontario and Michigan have also entered into binational agreements regarding Great Lakes water quality issues. Recently, in April 1988, two Memoranda of Understanding were signed; one concerning accidental discharges of contaminants into the Great Lakes and the other, an associated Joint Notification Plan for such discharges.

2. Federal, State and Provincial Environmental Control Legislation and Programs - An Overview

Numerous legislative acts, regulations and programs exist at the federal, state and provincial levels which regulate point and some nonpoint source discharges, and affect ambient water, sediment and biota quality. Table III-1 lists major environmental acts from which specific environmental regulations and programs are derived. In most cases, a variety of regulations and programs are developed from each act, making their effect far-reaching. These major acts provide a comprehensive framework with which to control or reduce inputs of contaminants to the Great Lakes basin, and are discussed below.

TABLE III-1

Environmental Legislation affecting Great Lakes ecosystem quality.

BINATIONAL LEGISLATION	MEDIA OR ACTIVITY ADDRESSED												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Great Lakes Water Quality Agreement (GLWQA)	2	2	2	2	2	2	2	2	2	2	2	2	2
Ontario-Michigan Memorandum of Understanding on Notification									2		2		
Ontario-Michigan Declaration on Partnership and Memorandum on Cooperation	2	2	2	2	2		2	2	2	2	2		2

KEY TO CODES:

A: Ambient Surface Water and Ground Water Quality and Management
B: Sediment Quality and Management
C: Biota Quality and Habitat Management
D: Industrial Point Source Discharge Control
E: Municipal Point Source Discharge Control
F: Solid and Hazardous Waste Management
G: Pesticide Manufacture and Management
H: Urban Runoff and Combined Sewer Overflow Management
I: Air Point Source Discharge and Ambient Air Quality Control
J: Agricultural Land Management
K: Spills and Shipping Activities
L: Drinking Water Quality Control and Management
M: Fish Consumption Guidelines or Advisories

1: Legislation is responsible for legally enforceable standards and/or has direct authority over the media or activity.
2: Legislation provides non-enforceable guidance or authority over media or activity.
3: Legislation is not directly applicable to the media or activity, but media/activity may be impacted by execution of its legislative mandate.

TABLE III-1. (cont'd 2)

CANADA LEGISLATION	MEDIA OR ACTIVITY ADDRESSED												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Fisheries Act	1	3	1	1		3							3
Canada Water Act	2	2	3		2								
Canadian Environmental Protection Act (CEPA)	3	3	3	1	1	1	1	2	1		1		
Food and Drug Act													1
Canada Shipping Act	3	3	3								1		
Transportation of Dangerous Goods Act (TDGA)	3	3	3								1		
Pest Control Products Act (PCPA)							1			3			
Canadian Clean Air Act									1				
Environmental Contaminants Act						1							

ONTARIO LEGISLATION	MEDIA OR ACTIVITY ADDRESSED												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Ontario Water Resources Act (OWRA)	1	3	1	1	1					2		1	
Ontario Environmental Protection Act (EPA)	3	2	3	1	1	1		2	1	3	1		
Dangerous Goods Act						1					1		
Drainage Act								2			2		
Pesticides Act							1			1			

TABLE III-1. (cont'd 3)

UNITED STATES LEGISLATION	MEDIA OR ACTIVITY ADDRESSED												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Clean Water Act (CWA)	1	1	1	1	1	3		2			1		
Safe Drinking Water Act (SDWA)	1					1						1	
Food, Drug and Cosmetic Act							3						1
Clean Air Act (CAA)						3			1				
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	1	3	3			1					1		
Solid Waste Disposal Act (SWDA)						1	1				1		
Toxic Substances Control Act (TSCA)						1	1				1		
Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)							1			3			
Agricultural, Rural Development and Related Agencies Appropriations Act	2									2			
Soil Conservation and Domestic Allotment Act	3									2			
Endangered Species Act			1			3							
National Environmental Policy Act (NEPA)*	2	2	2	2	2	2	2	2	2	2	2	2	2

* NEPA is discussed in Appendix 3.

TABLE III-1. (cont'd 4)

MICHIGAN LEGISLATION	MEDIA OR ACTIVITY ADDRESSED												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Water Resources Commission Act (Act 245)	1	3	1	1	1		1	1		1	1		
Safe Drinking Water Act (Act 399)	1					1						1	
Michigan Air Pollution Act									1				
Watercraft Pollution Control Act (Act 167)											1		
Michigan Hazardous Waste Management Act (Act 64)	3					1	1				1		
Michigan Liquid Industrial Waste Disposal Act (Act 136)						1					1		
Michigan Solid Waste Management Act (Act 641)	3					1					1		
Michigan Environmental Response Act (Act 307)						1							
Inland Lakes and Streams Act (Act 346)	1	1	3										
Great Lakes Submerged Lands Act (Act 247)		2											
Michigan Resource Recovery Act (Act 366)						2							
Michigan Underground Storage Tank Act (Act 423)						1							
Michigan Wetlands Protection Act	1	1	3										
Michigan Shorelines Protection and Management Act	1		1										
Michigan Motor Vehicle Emissions Inspection Act (Act 83)									1				
Michigan Oil & Gas Act (Act 61)	3	3	3			1					1		
Michigan Act 98					1								

B. ENVIRONMENTAL MEDIA STANDARDS, CRITERIA, OBJECTIVES AND GUIDELINES

Media quality is often evaluated by comparing media contaminant concentrations with numerical concentration limits, set by regulation or agreement. Point source discharges are often controlled by the imposition of contaminant concentration or loading limits on effluent or stack air emissions. Various regulations and agreements have developed "standards", "criteria", "objectives" or "guidelines" to specify these concentration or loading limits. In general, standards, and in some cases criteria, are enforceable by law. These limits are usually based on regulatory agency policies (e.g., state water quality standards), but may be derived from scientific principles or studies (e.g., concentration and loading limits achieved by the use of best available technology).

Objectives, guidelines and, in most cases, criteria are suggested limits established by regulatory agencies, such as the United States Environmental Protection Agency (U.S.EPA), Michigan Department of Natural Resources (MDNR) or Ontario Ministry of the Environment (OMOE), as well as by other non-regulatory agencies, such as the International Joint Commission (IJC). These limits are often based upon known or suspected impacts on human, animal or aquatic life, and may be used to establish legally enforceable limits as agency standards, or by incorporation into specific agency documents, such as Certificates of Approval.

1. Water Quality Regulations and Guidelines

Numerical ambient water quality limits have been established by federal, state and provincial statutes, as well as by binational agreement. Parameter-specific ambient water quality standards, criteria or objectives applicable to the UGLCC Study parameters of concern are summarized in Table III-2; a comprehensive list of ambient water quality limits is contained in the Regulatory Task Force Report (1). These limits establish maximum concentrations allowable in surface waters for the protection of human health, animal and aquatic life and recreational use. These limits are continually being reviewed and updated by state, provincial and federal agencies. Regulatory agencies may adopt objectives set by other regulatory or nonregulatory agencies on an interim basis for parameters for which agency objectives have not been established.

GLWQA specific objectives are nonenforceable goals for water bodies within the Great Lakes Basin, in both the US and Canada. Ontario Provincial Water Quality Objectives (PWQO), developed under the authority of the Ontario Water Resources Act, and U.S.EPA Ambient Water Quality Criteria (AWQC), developed under the authority of the Clean Water Act, are similar in that they

TABLE III-2

Ambient water quality criteria, guidelines, or objectives for parameters of concern in the UGLCC (ug/L).

PARAMETER	GREAT LAKES WATER QUALITY AGREEMENT SPECIFIC OBJECTIVE	ONTARIO WATER QUALITY OBJECTIVE (PWQO)	U.S.EPA ACUTE AMBIENT WATER QUALITY CRITERIA (AWQC)	U.S.EPA CHRONIC AMBIENT WATER QUALITY CRITERIA (AWQC)	U.S.EPA AWQC HUMAN HEALTH CRITERIA (Water & Fish)[1]	U.S.EPA AWQC HUMAN HEALTH CRITERIA (Fish only)[1]	MICHIGAN RULE 57(2) GUIDELINE LEVELS[2]
AMMONIA	0.02	0.02	pH/temp dependent		-	-	20(coldwater)
CADMIUM	0.2	0.2	3.9+	1.1+	10	-	0.4+
CHLORAMINES	-	-	-	-	-	-	-
CHLORIDES	-	-	-	-	-	-	-
CHLORINE	-	0.002	0.019	0.011	-	-	6
CHLORINATED PHENOLS	-	-	-	-	-	-	-[4]
CHROMIUM (TOTAL)	50	100	-	-	-	-	52+
CHROMIUM (HEXA)	-	-	16	11	50	-	6
CHROMIUM (TRI)	-	-	1700+	210+	170mg/L	3,433mg/L	-
COBALT	-	-	-	-	-	-	-
COPPER	5	5	18+	12+	-	-	21+
CYANIDE	-	5	22	5.2	200	-	5
HCB	-	0.0065	-	-	0.72ng/L	0.74ng/L	0.0019
IRON	300	300	-	1000	300	-	-
LEAD	25[3]	25	82+	3.2+	50	-	3+
MERCURY	0.2	0.2	2.4	0.012	144ng/L	146ng/L	0.6ng/L[5]
NICKEL	25	25	1400+	160+	13.4	100	78+
OIL/GREASE	-	-	-	-	-	-	-
OCS	-	-	-	-	-	-	-
PHENOL	-	-	10,200*	2560*	3500	-	230
PHOSPHORUS (LAKES)	-	0.02	-	-	-	-	-
PHOSPHORUS (RIVERS)	-	0.03	-	-	-	-	-
PCB	-	0.001	2.0	0.014	0.079ng/L	0.079ng/L	0.012ng/L
PAH	-	-	-	-	2.8ng/L	31.1ng/L	-
ZINC	30	30	120+	110+	-	-	98

\+ Criteria is hardness-dependent. Value shown is based on a calcium carbonate hardness of 100 mg/L.

* Value shown is not criteria, but is lowest observed adverse effect level (LOAEL).

1 U.S.EPA Ambient Water Quality Criteria for Human Health is based on either consumption of 2 liters of water per day and 6.5 gm of fish per day, or consumption of 6.5 g of fish per day only. Guidance for carcinogens is based on a 1E-06 risk level, using the U.S.EPA-adopted risk extrapolation method.

2 Michigan Rule 57(2) Guidelines apply to contaminant concentrations at the edge of a defined mixing zone (values as of January 1988, subject to change)

3 Not applicable to Lakes Huron or Superior.

4 Guidelines do exist for specific chlorinated phenols; see Appendix 3.

5 Guideline is for methyl mercury.

are also goals for water quality. However, both PWQO and AWQC are often the starting point for the development of point source effluent limitations, and in the case of AWQC, become enforceable state water quality standards in states which have not promulgated more stringent state standards. U.S.EPA AWQC Human Health Criteria are criteria for water quality, based on the potential human health effects resulting from consumption of 2 liters of water and 6.5 g of fish per day, or consumption of 6.5 g fish per day only.

In Michigan, criteria for ambient water concentrations of toxic contaminants are based on Rule 57(2), which is based on Part 4 of the Michigan Water Resources Commission rules. Rule 57(2) was developed to protect human health, fish and wildlife from exposure to toxicants in surface water. It is a narrative rule for the calculation of "edge-of-the-mixing-zone" concentrations for toxics and is intended to be used in determining allowable levels for point source discharges. However, MDNR uses Rule 57(2) allowable levels as goals, particularly where ambient concentrations are in excess of these values. Rule 57(2) values are water body-specific, where appropriate, and are based on the most restrictive of human health, fish or wildlife criteria. Use of Rule 57(2) values may not be appropriate if ambient water quality exceeds Rule 57(2) allowable levels. In such cases, Rule 98, Antidegradation, may be more appropriate.

Both federal governments and the province have also established drinking water quality limits to protect human health. These limits for the UGLCC Study parameters of concern are summarized in Table III-3; a comprehensive list of drinking water limits is provided in the Regulatory Task Force Report (1). These requirements are based on known or suspected human health effects, but may include consideration of other factors such as treatment techniques, cost and available laboratory analyses. Drinking water limits may also be promulgated for nonhealth based parameters, such as odor and color, which are used to judge the acceptability of surface water supplies and treated water quality for drinking water purposes. Drinking water quality limits may be more or less stringent than ambient water quality objectives, standards or criteria, depending on the parameter considered.

The U.S.EPA National Primary Drinking Water Regulations, developed under the authority of the Safe Drinking Water Act, include Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs). MCLs are enforceable drinking water standards with which drinking water supplies must comply. MCLs are based on health effects, but also consider economic and technical factors. MCLGs are entirely health-based and are not enforceable. A chemical's MCLG serves as a starting point for the development of its MCL, which is set as close to the MCLG as feasible. U.S. EPA Secondary Drinking Water Regulations (also called MCLs) are recommended limits for aesthetic qualities of drinking water,

TABLE III-3

Drinking water standards, objectives and criteria for parameters of concern in the UGLCC (mg/L).

PARAMETER	U.S.EPA MAXIMUM CONTAMINANT LEVEL (MCL)[1,2]	U.S.EPA MAXIMUM CONTAMINANT LEVEL GOAL (MCLG)[1,3]	U.S.EPA SECONDARY DRINKING WATER REQUIREMENT (MCL)[4]	HEALTH&WELFARE CANADA MAXIMUM ACCEPTABLE CONCENTRATION (MAC)[2]	ONTARIO MAXIMUM ACCEPTABLE CONCENTRATION (MAC)[2]	ONTARIO MAXIMUM DESIRABLE CONCENTRATION (MDC)[4]
AMMONIA	-	-	-	-	-	-
CADMIUM	0.01	0.005	-	0.005	0.005	-
CHLORAMINES	-	-	-	-	-	-
CHLORIDE	-	-	250	250	-	250
CHLORINE	-	-	-	-	-	-
CHLORINATED PHENOLS	-	-	-	-	-	-
CHROMIUM	0.05	0.12	-	0.05	0.05	-
COBALT	-	-	-	-	-	-
COPPER	-	1.3	1.0	-	1.0	1.0
CYANIDE	-	-	-	0.2	0.2	-
HCB	-	-	-	-	-	-
IRON	-	-	0.3	-	0.3	0.3
LEAD	0.05	0.02	-	0.05	0.05	-
MERCURY	0.002	0.003	-	0.001	0.001	-
NICKEL	-	-	-	-	-	-
OIL/GREASE	-	-	-	-	-	-
OCS	-	-	-	-	-	-
PHENOLS	-	-	-	-	-	0.002
PHOSPHORUS	-	-	-	-	-	-
PCB (total)	-	-	-	-	0.003	-
PAH (total)	-	-	-	-	-	-
ZINC	-	-	5	-	-	5

1 National Primary Drinking Water Regulations.
2 Enforceable drinking water requirement.
3 Nonenforceable health-based drinking water guidance.
4 Nonenforceable guidance for aesthetics.

such as color, taste and odor, and are not federally enforceable. There are no state-developed drinking water standards, however, Michigan uses the federal standards by reference in the state's Drinking Water Act.

The Health and Welfare Canada Maximum Acceptable Concentration (MAC) is the enforceable drinking water requirement in Canada. Ontario has adopted most of these MACs for the provincial standards, which are developed under the authority of the Ontario Water Resources Act. The Ontario MACs are based on known or suspected human health effects, and are enforceable standards for drinking water supplies in Ontario. The Ontario Maximum Desirable Concentration (MDC) is based on aesthetics, and is a nonenforceable goal.

Other statues which can impact on surface water quality include, in Canada, the Fisheries Act and the Canadian Environmental Protection Act (CEPA), and in Michigan, the Michigan Wetlands Protection Act (Act 203), the Inland Lakes and Streams Act (Act 346), the Michigan Shorelines Protection and Management Act (Act 245) and the Great Lakes Submerged Lands Act (Act 247).

2. Sediment Quality Regulations or Guidelines

The GLWQA, in Annexes 7 and 14, addresses sediment quality from the perspective of studying, evaluating and monitoring dredging activities and in-place, contaminated sediments within the Great Lakes, but has not derived specific objectives for contaminants in sediments.

Guidelines for the disposal of dredged material, based on contaminant concentrations in sediments, have been established by the OMOE 1978 revised Guidelines for Dredged Spoils for Open Water Disposal and the U.S.EPA Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments. The OMOE allows open water disposal of dredged materials that meet or are lower than the established guidelines, providing existing water uses are not affected. The U.S.EPA Region V Guidelines were developed under pressure for the need for some guidance, but have not been adequately related to the impact of sediments on lakes, and should be considered interim guidelines until more scientifically sound guidelines are developed. The U.S.EPA is in the process of developing sediment criteria. Dredging guidelines are summarized in Table III-4. Table III-4 also shows the guidelines for evaluation of Great Lakes Dredging Projects, developed by the Dredging Subcommittee of the Great Lakes Water Quality Board. These guidelines are average concentrations of surficial sediments in Lakes Huron and Erie (guidelines for the other lakes have also been developed). Sediment concentrations exceeding these levels

TABLE III-4

USEPA, OMOE and Great Lakes Water Quality Board sediment dredging guidelines (mg/kg).

PARAMETER	ONTARIO MOE GUIDELINES[1]	U.S.EPA GUIDELINES[2] Nonpolluted	U.S.EPA GUIDELINES[2] Moderately Polluted	U.S.EPA GUIDELINES[2] Heavily Polluted	GLWQB DREDGING GUIDELINES[3] Lake Huron	GLWQB DREDGING GUIDELINES[3] Lake Erie
Total Phosphorus	1000	<420	420-650	>650	570	960
Total Kjeldahl Nitrogen	2000	<1000	1000-2000	>2000	-	-
Ammonia	100	<75	75-200	>200	-	-
Volatile Solids	60,000	<50,000	50,000-80,000	>80,000	-	-
Chemical Oxygen Demand	50,000	<40,000	40,000-80,000	>80,000	-	-
Oil & Grease	1500	<1000	1000-2000	>2000	-	-
Arsenic	8	<3	3-8	>8	1.1	3.2
Barium	-	<20	20-60	>60	-	-
Cadmium	1	-	-	>6	1.4	2.5
Chromium	25	<25	25-75	>75	32	53
Cobalt	50	-	-	-	-	-
Copper	25	<25	25-50	>50	32	39
Cyanide	0.1	<0.1	0.1-0.25	>0.25	-	-
Iron	10,000	<17,000	17,000-25,000	>25,000	-	-
Lead	50	<40	40-60	>60	49	112
Manganese	-	<300	300-500	>500	-	-
Mercury	0.3		>1 ("Polluted")		0.22	0.58
Nickel	25	<20	20-50	>50	39	49
PCB	0.05		>10("Polluted")		0.009-0.033	0.074-0.252
Silver	0.5	-	-	-	-	-
Selenium	-	-	-	-	0.9	0.79
Zinc	100	<90	90-200	>200	62	177

1 Ontario Ministry of the Environment Guidelines for Dredge Spoils for Open Water Disposal
2 U.S.EPA Guidelines for the Pollutional Classification of Great Lakes Harbor Sediments
3 Guidelines for the Evaluation of Great Lakes Dredging Projects, Dredging Subcommittee, Great Lakes Water Quality Board, International Joint Commission.

are considered degraded and should not be disposed in the open lake. Since guidelines for contaminant concentrations in in-place sediments have not been derived, these dredging guidelines are often used in place of sediment criteria.

Contaminated sediments constitute a significant environmental concern in the Great Lakes Basin, and these guidelines are under review by most agencies. Special advisory groups, such as the Polluted Sediment Subcommittee under the Canada-Ontario Agreement, have been established to review sediment guidelines and assessment criteria, to evaluate dredging activities and in-place remedial options, and to provide expert advice on infilling practices.

Regulations which address dredging or remediation of contaminated sediments are discussed in a later section.

3. Aquatic Biota Quality Regulations or Guidelines

Many of the ambient water quality limits and guidelines were developed from an understanding of the effects of contaminants on aquatic life. Therefore, such limits and guidelines directly affect the health of aquatic biota. There is considerable legislation, not directly related to environmental quality, which exists to protect terrestrial and aquatic species, such as the U.S. Endangered Species Act of 1973, which identifies threatened and endangered species and their habitats. A more complete discussion on such legislation is contained in the Regulatory Task Force Report (1).

The quality of aquatic biota is also important from a human health perspective, when biota are consumed as a food source. Fish consumption advisories are developed by different regulatory agencies to provide guidance to the public on the safety of consuming fish which are, or may be, contaminated. These advisories are usually based on the concentration of contaminants contained in the edible portion of fish, and restrict consumption to varying degrees when contaminant concentrations exceed these levels.

Different concentration limits have been established by the GLWQA, the U.S. Food and Drug Administration (FDA), Ontario Ministry of the Environment, Health and Welfare Canada, and the Michigan Department of Public Health. Table III-5 summarizes these limits. Some of the sampling and analytical techniques associated with determining contaminant concentrations may vary from jurisdiction to jurisdiction. For example, Ontario employs a skinless fillet as an edible portion, whereas Michigan employs a skin-on fillet for some fish and a skin-off fillet for others.

TABLE III-5

Fish consumption guidelines, objectives, tolerances and action levels applicable to the UGLCC (ug/g).

PARAMETER	GREAT LAKES WATER QUALITY AGREEMENT SPECIFIC OBJECTIVE[1]	U.S.FDA ACTION LEVEL(A) OR TOLERANCE(T)[2]	HEALTH & WELFARE CANADA FISH CONSUMPTION ADVISORIES[3]	ONTARIO FISH CONSUMPTION GUIDELINES[4] (Restricted Consumption)	ONTARIO FISH CONSUMPTION GUIDELINES[5] (No Consumption)	MICHIGAN PUBLIC HEALTH FISH CONSUMPTION ADVISORY TRIGGER LEVELS[6]
Aldrin	0.3	0.3(A)	-	-	-	0.3
Chlordane	-	0.3(A)	-	-	-	0.3
Chlordecone	-	0.3(A)	-	-	-	-
2,4D	-	1.0(T)	-	-	-	-
DDT	1.0	-	5.0	5.0	-	5.0
Dieldrin	0.3	-	-	-	-	0.3
Diquat	-	0.1(T)	-	-	-	-
Endrin	0.3	0.3(A)	-	-	-	0.3
Fluridone	-	0.5(T)	-	-	-	-
Glyphosate	-	0.25(T)	-	-	-	-
Heptachlor & H.Epoxide	0.3	0.3(A)	-	-	-	0.3
Lead	-	-	-	1.0	-	-
Lindane	0.3	-	-	-	-	-
Mercury	0.5	1.0(A)	0.5	0.5	1.5	0.5
Mirex	<DL	0.1(A)	0.1	0.1	-	0.1
PCB	0.1	2.0(A)	2.0	2.0	-	2.0
Simazine	-	12.0(T)	-	-	-	-
Toxaphene	-	-	-	-	-	5.0
Triclopyr	-	0.2(T)	-	-	-	-
2378-TCDD (ppt)	-	25[7] (limited consumption)	20	20	-	10
2378-TCDD (ppt)	-	50[7] (no consumption)				

<DL Less than Detection Limit.

1 The GLWQA specific objectives refers to concentrations in the edible portion of fish, wet weight, for all contaminants except DDT, mercury and PCB, which are for whole fish concentrations.

2 U.S. Food and Drug Administration Action Levels and Tolerances are based on edible portions of fish; discussion on Action Levels vs. Tolerances is discussed in text.

3 Health and Welfare Canada requirements are for fish in commerce only.

4 Ontario Fish Consumption Guidelines are based on a skinless dorsal fillet. Restricted consumption guidelines: unrestricted consumption below and restricted consumption above this guideline, except for women of child-bearing age and children under 15 years of age, where restricted consumption below and no consumption above this guideline is recommended.

5 No consumption is recommended above this guideline for all populations.

6 Michigan Trigger Levels are based on analyses from skin-on fillets or skinless fillets, depending on fish type.

7 U.S.FDA limits for 2,3,7,8-tetrachlorodibenzo(p)dioxin (2378-TCDD) are guidance only.

FDA action levels and tolerances are contaminant limits in edible fish flesh developed by either the FDA or the U.S.EPA, and apply only to fish in interstate commerce. The authority for the development of action levels and tolerances comes from the Federal Food, Drug and Cosmetic Act. FDA action levels and tolerances differ in that tolerances apply to registered chemicals in current use and action levels to chemicals for which legal use has been prohibited. FDA action levels and tolerances are not intended to be used to regulate sport-caught fish. Michigan Trigger Levels, which do apply to sport-caught fish, are, in many cases, identical to FDA action levels and tolerances; however, the Trigger Levels were derived independently.

Health and Welfare Canada, under the Food and Drug Act, has established some federal fish consumption advisories, with restricted consumption being advised for fish exceeding the guidelines. The Ontario Fish Consumption Guidelines, developed by OMOE and Ontario Ministry of Natural Resources, based on guidance from the federal Food and Drug Act, have adopted many of the federal consumption guidelines, and provide restricted consumption guidelines below which consumption may be unrestricted and above which restricted consumption is advised (or no consumption, in the cases of women of child-bearing age and children under 15 years of age). Mercury also has a No Consumption guideline, above which no consumption is advised for all populations.

Both Ontario and Michigan publish readily available fish consumption advisory guides identifying consumption advisories in effect for various fish species, sizes and water bodies. The GLWQA has established specific objectives for several contaminants in the edible portion of fish for the protection of human health, in addition to contaminants in whole fish for the protection of fish-consuming wildlife and aquatic birds.

C. POINT SOURCE CONTAMINANT CONTROLS

Much of the focus of federal, provincial and state legislation and the GLWQA is directed towards the control and reduction of excessive contaminant input from point source dischargers. The regulatory basis for these control programs is discussed below.

1. Industrial Point Sources

Surface and Groundwater

Article VI of the GLWQA requires the governments of Canada and the U.S. to develop and implement programs to abate, control and prevent pollution resulting from industrial point sources by establishing effluent limits and effective enforcement programs.

Environment Canada, through industry-specific regulations under the Fisheries Act, regulates the discharge of conventional contaminants and acute toxicity (defined by bioassays) from petroleum refineries, pulp and paper mills and other specific industrial sectors. These federal regulations and guidelines for effluent quality are based on the application of best practicable technology. Regulations and guidelines have not been promulgated for some major industrial sectors, such as organic chemical, iron and steel industries.

Ontario establishes and enforces effluent requirements at least as stringent as that established by the federal government. In addition, provincial objectives are implemented under the Environmental Protection Act (EPA) and the Ontario Water Resources Act (OWRA), using voluntary measures, formal programs, Control Orders, Directions and Requirements, Certificates of Approval and prosecution. Industrial effluent objectives for conventional parameters, metals, phenols and some toxic substances are established under OWRA, which sets out desirable effluent discharge characteristics necessary to protect receiving water quality. These industrial effluent objectives are shown in Table III-6. Enforceable effluent limits, such as Control Orders, may require the attainment of the industrial effluent objectives and may also require compliance with additional parameters.

A recent initiative is being taken in Ontario to reduce toxic substance discharges to surface waters: the Municipal and Industrial Strategy for Abatement (MISA). MISA will require, by regulation, each of nine industrial sectors and the municipal sector to implement a comprehensive monitoring program to characterize its effluent and then to implement the best available technology economically achievable (BATEA) to reduce the discharge of toxic contaminants. If, after installation of BATEA, any environmental impacts resulting from a facility's discharge

TABLE III-6

Ontario industrial effluent objectives[1].

PARAMETER	ONTARIO INDUSTRIAL EFFLUENT OBJECTIVE
Ammonia-Nitrogen mg/L	10
BOD_5 mg/L[2]	15
Cadmium mg/L	0.001
Chromium mg/L	1.0
Copper mg/L	1.0
Fecal Coliforms MF/100mL	-
Lead mg/L	1.0
Mercury mg/L	0.001
Nickel mg/L	1.0
Oil and Grease mg/L	15
pH	5.5-9.5
Phenols mg/L	0.02
Phosphorus mg/L	-
Suspended Solids mg/L	15
Tin mg/L	1.0
Total Residual Chlorine mg/L	-
Zinc mg/L	1.0

1 Established under Ontario Water Resources Act
2 5-day biological oxygen demand

persist, the facility will be required to implement additional effluent treatment. Implementation of MISA monitoring and effluent limit regulations will occur over the next two years.

The U.S. Clean Water Act authorizes the U.S.EPA to delegate, to state regulatory agencies, regulatory authority over the discharge of contaminants from municipal and industrial point sources. Michigan was delegated this authority in 1973, and directs the National Pollutant Discharge Elimination System (NPDES) permit program for point sources in the state. Under this program, discharge permits are issued to facilities, and stipulate the extent of allowable contaminant discharge. Effluent limits are often based on best available technology (BAT) for unconventional and toxic pollutants and on best conventional technology (BCT) for conventional pollutants, and may be expressed as a concentration, a mass loading limit or both. Often, effluent limitations are placed on only a few parameters, usually conventional pollutants. Industries may discharge to the sewer system of a municipal waste treatment facility, rather than discharging directly to a surface water body. In such cases, the municipal facility may issue an Industrial Pretreatment Program (IPP) permit to the industry, specifying acceptable industrial effluent quality. Alternately, states may issue the IPP permit to the industrial facility.

In both Ontario and Michigan, site-specific effluent requirements are frequently based on protection of the receiving water. In Ontario, this is done by way of requirements and Direction, or Certificates of Approval, both under the Ontario Water Resources Act, or by Orders (e.g., Control or Directors Orders) under the Environmental Protection Act. In Michigan, this is accomplished under the NPDES permit program.

Air

Annex 15 of the GLWQA instructs the two governments to conduct research, surveillance and monitoring, and to implement control measures to reduce atmospheric deposition of toxic substances to the Great Lakes Basin. The Agreement calls for the development of control measures and technologies to reduce the sources of atmospheric emissions.

Under Canada's Environmental Protection Act (CEPA), industrial emission standards, regulations and guidelines have been established for several substances. The provincial Air Pollution Control (General) Regulations prescribe the maximum concentration of a contaminant at a point of impingement.

In the U.S., the Clean Air Act (CAA) gives authority to the U.S. EPA to develop programs affecting air quality. The U.S.EPA has developed ambient air standards and emission standards for speci-

fic pollutants. National Ambient Air Quality Standards (NAAQS) have been developed for several chemicals. Control of these and other "hazardous" air pollutants (as defined) is obtained by regulating their emission from point sources. The basic point source emission standard developed under the CAA is the National Emission Standard for Hazardous Air Pollutants (NESHAP). NESHAPs are applied to different industrial categories. For certain classes of new industrial sources, New Source Performance Standards (NSPS), based on best demonstrated technology, also apply. In addition, other emission permits may be needed.

Under the CAA, primary control over point source air emissions and other air programs occurs at the state level through state air programs. In 1973, Michigan submitted, and subsequently received approval for, their State Implementation Plan (SIP). Through the SIP, Michigan's Air Quality Division has delegation of authority from the U.S.EPA for compliance and enforcement of NESHAPs. Inspection of NESHAP sources are required to be routinely performed.

2. Municipal Point Sources

Article VI and Annex 3 of the GLWQA support the adoption of controls to reduce pollution resulting from municipal waste treatment facilities. Goals include the development of programs and measures to ensure proper facility construction and operation, development of pretreatment requirements, establishment of effective enforcement programs, and the reduction of most effluent phosphorus concentrations to 1 mg/L or below.

In Canada, control over municipal waste treatment facilities lies primarily with the provincial government, under the authority of the Ontario Water Resources Act and the Ontario Environmental Protection Act. The federal government does, however, restrict the phosphorus content in detergents to 0.5% (as phosphorus pentoxide on a weight/weight basis) as a method of reducing phosphorus discharges from municipal facilities, and has recommended municipal effluent objectives. The provincial government establishes minimum treatment requirements for municipal facilities, which limit concentrations of total phosphorus in effluent to 1 mg/L, as well as specifying minimum removal rates or maximum concentrations for biological oxygen demand (BOD_5) and total suspended solids (TSS), based on the level of treatment performed at the facility (Table III-7). Municipal waste treatment facilities will also be regulated under the MISA program.

In the U.S., the NPDES program of the Clean Water Act regulates municipal facilities, and permits are issued to individual

TABLE III-7

Revised Ontario effluent guidelines for wastewater treatment facilities (OMOE policy 08-01).

TREATMENT	BIOLOGICAL OXYGEN DEMAND	SUSPENDED SOLIDS	TOTAL PHOSPHORUS (mg/L)
PRIMARY			
without P removal	30% removal	50% removal	-
with P removal	50% removal	70% removal	1.0
SECONDARY			
without P removal	25 mg/L	25 mg/L	-
with P removal	25 mg/L	25 mg/L	1.0
CONTINUOUS DISCHARGE LAGOON			
without P removal	30 mg/L	40 mg/L	-
with P removal	30 mg/L	40 mg/L	1.0
SEASONAL DISCHARGE LAGOON			
with P removal	30 mg/L	40 mg/L	-
continuous P removal	30 mg/L	40 mg/L	1.0
batch P removal	25 mg/L	25 mg/L	1.0

Note: "Where warranted, a higher degree of treatment shall be required to meet the site-specific effluent requirements developed for each particular receiving water."

Table Adapted from "Report to the Great Lakes Water Quality Board, Guidance on Characterization of Toxic Substances Problems in Areas of Concern in the Great Lakes Basin.", March, 1987.

facilities specifying concentration and/or mass loading discharge limits on specific parameters, usually conventional pollutants. As mentioned, Michigan has obtained primacy for control of this program, and NPDES permits are issued by the MDNR. Among other previously mentioned legislation, Michigan's Act 98, as amended, provides for the classification, specification, certification and supervision of municipal waste treatment systems by the state health commissioner, as well as providing penalties for violations.

Municipal facilities which receive waste water from industrial facilities usually operate an industrial pretreatment program (IPP). In this program, permits are issued by either the municipal waste treatment facility or the state to industries which discharge to sewer systems, and specify pretreatment requirements for the effluent. The pretreatment requirements are either local limits developed for the protection of the waste treatment facility, or federally promulgated categorical pretreatment requirements, whichever are more stringent.

D. NONPOINT SOURCE CONTAMINANT CONTROL

1. Agricultural Runoff

The GLWQA identifies agriculture as an activity which requires management programs to reduce contaminant and nutrient loading and soil erosion to adjacent surface waters. The Agreement supports the implementation of programs which are consonant with these goals, including improved fertilization and manure management practices, conservation tillage practices and others.

Agriculture Canada and the Ontario Ministry of Agriculture and Food (OMAF) have instituted programs to educate farmers on new technologies, crop rotation and soil conservation practices through the Soil and Water Environmental Enhancement Program (SWEEP). OMAF provides soil testing services for farmers to determine appropriate application rates for fertilizers and lime. The Agricultural Code of Practices for Ontario (1973) promotes proper application of livestock manure to cropland in order to reduce nutrient loads to ground- or surface water. The Ontario Ministry of the Environment has outlined restrictions on application rates and times and contaminant concentrations in sewage sludges applied to agricultural land, as shown in Table III-8.

In the U.S., control of pollution from agricultural activities is also based on a management approach. The U.S. Department of Agriculture (USDA) can reduce funding benefits to farmers who produce agricultural commodities on highly erodible lands or wetlands as an indirect incentive to reduce erosion and preserve wetlands. The USDA and the U.S. EPA also use programs developed under the Agricultural, Rural Development and Related Agencies Appropriations Act and the Soil Conservation and Allotment Act to protect against soil erosion, and to prevent and/or abate water pollution for agricultural sources. Michigan's Nonpoint Sources Management Program, the Michigan Phosphorus Reduction Strategy and the Michigan Energy Conservation Program are all intended to provide management, technical, or financial support to minimize erosion and the loss of fertilizers, pesticides and manure to rural surface waters. Michigan's Guidance for Land Application of Wastewater Sludge is shown in Table III-8.

2. Pesticides

Article VI of the GLWQA calls for measures to inventory, control and research the impacts of pesticides used in the Great Lakes Basin, and to ensure they are used in a correct and legal manner. The GLWQA has also developed specific objectives for several pesticides in both water and biota.

TABLE III-8

Guidelines and criteria for agricultural application of wastewater sludge.

PARAMETER	ONTARIO MAXIMUM PERMISSIBLE CONCENTRATION (mg/kg solids)[1]	MICHIGAN GUIDELINES FOR APPLICATION OF WASTEWATER SLUDGE CLASS 1[2] (mg/kg)	CLASS 2[3] (mg/kg)	CLASS 3[4] (mg/kg)
Arsenic	170	100	100-2000	2000
Cadmium	34	5	5-125	125
Chromium	2800	50	50-5000	5000
Cobalt	340	-	-	-
Copper	1700	250	250-2000	2000
Lead	1100	250	250-2000	2000
Mercury	11	2	2-10	10
Molybdenum	94	10	10-50	50
Nickel	420	25	25-1000	1000
PCB	-	1	1-10	NA
Selenium	34	10	10-80	80
Zinc	4200	750	750-5000	5000

1 For all aerobic sewage sludge and dried/dewatered anaerobic sewage sludge; other regulations apply for liquid anaerobic sludge.

2 May be applied to all manner of crops with little restrictions on use.

3 May be applied to crops in accordance with computed site limitations on annual and lifetime metals accumulation.

4 May only be applied to crop lands under carefully controlled rates which are consistent with computed site assimilation rates; sludges containing greater than 10 ppm PCB may not be land-applied.

Canada's federal Pest Control Products Act, and the Ontario Pesticides Act regulate the manufacture, registration and use of pesticides in Canada. Nonregulatory programs at the federal level include the Integrated Pest Management Program, currently being developed by Agriculture Canada. Its aim is to develop a management scheme to reduce reliance on chemical pest control. The Provincial Pesticides Act prohibits the harmful discharge of pesticides and requires the licensing of commercial pesticide applicators. The Ontario Ministry of Agriculture and Food (OMAF) is also involved in the Integrated Pest Management Program.

In the U.S., the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) regulations address the manufacture, distribution, storage, disposal and use of approximately 50,000 pesticide products and devices. FIFRA also provides standards for the certification of commercial and private applicators of restricted use pesticides. Regulations under the Federal Food, Drug and Cosmetic Act establish allowable limits (residues) of pesticides in food or feed crops prior to pesticide registration. The Resource Conservation and Recovery Act (RCRA) regulates the treatment, storage and disposal of some pesticides. Many aspects of Michigan's Nonpoint Source Management Program address the use of pesticides used on agricultural land.

3. Shipping

Article VI and Annexes 5 and 6 of the GLWQA contain provisions for the control of contaminants from shipping activities. Of primary concern are discharges of oily waste water, bilge water and untreated sewage, along with garbage and other hazardous substances in washings or spills.

The Canada Shipping Act (CSA) has spawned regulations directed at shipping that control discharges of oil and vessel wastes. The CSA requires ships to either treat their sewage before discharge or install holding tanks. The Transportation of Dangerous Goods Act (TDGA) prescribes safety requirements and standards for all means of transportation across Canada, including shipping. Ontario's Environmental Protection Act requires pleasure craft to be fitted with sewage holding tanks to contain waste water, which are emptied in a controlled manner at marinas.

In the U.S., the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) is, in part, concerned with the discharge of oil to navigable waters of the U.S. Michigan's Watercraft Control Act of 1970 prohibits the activities of littering or polluting the state's waters with sewage, oil or other liquid or solid material. Violators are fined and are responsible for cleanup of wastes.

4. Spills

Annex 9 of the GLWQA calls for a coordinated and integrated response to pollution incidents in the Great Lakes by responsible federal, state, provincial and local agencies through a Joint Contingency Plan. The objectives of this plan include development of preparedness measures, adequate cleanup response and extent, and other factors. Ontario and Michigan entered into such an agreement in April 1988, with the signing of the Ontario-Michigan Letter of Intent on Notification and Consultation Procedures for Unanticipated or Accidental Discharges of Pollutants into Shared Waters of the Great Lakes and Interconnecting Channels.

In Canada, control over spills lies primarily with the provincial government. The "Spills Bill", part IX of Ontario's Environmental Protection Act, deals with spills of pollutants into the natural environment, and establishes notification requirements, response procedures and compensation mechanisms. Ontario's Spills Action Centre (SAC) coordinates the Ministry's response network and other emergency responders.

In the U.S., regulations under CERCLA identify "hazardous substances", reportable quantities of these substances and notification requirements in the event of a release. CERCLA created the NCP, which is concerned with oil and hazardous material spills in navigable waters and the environment. The Clean Water Act also prohibits discharge of oil in harmful quantities, and requires owners and/or operators of facilities which present a threat of an oil discharge to surface water to prepare a Spill Prevention Control and Countermeasure (SPCC) plan. The Solid Waste Disposal Act (a.k.a. RCRA) requires transporters of hazardous substances to take appropriate action in the event of a spill, and to notify the National Response Center. The Emergency Planning and Right-To-Know Act requires participation by certain facilities in emergency planning procedures for spills. The Toxic Substances Control Act (TSCA) contains the PCB spill cleanup policy.

Michigan's Water Resources Commission Act rules (Part 5, Rules 151-169) regulate oil loading and unloading and storage, and specifies emergency response procedures for spills. Michigan Act 61, referred to as the Oil and Gas Act, requires operation of production and disposal wells in the state in such a manner as to prevent the escape of oil, gas, saltwater, brine or oil field wastes which would pollute, damage or destroy freshwater resources. Michigan DNR's Pollutional Emergency Alert System (PEAS) investigates and responds to emergency spill occurrences and coordinates with other concerned agencies.

5. Urban Runoff and Combined Sewer Overflows

Annex 13 of the GLWQA calls for the development of programs to abate, control and prevent contaminants from being discharged from nonpoint sources, including runoff from urban land. Article VI calls for, in part, control of contaminants from combined sewer systems.

In Canada, Guidance for Urban Drainage Design, Erosion and Sediment Control for Urban Construction Sites is developed under the provincial Drainage Act, while stormwater is informally controlled through reviews and comments on official plans and applications for development of subdivisions. No control strategies exist for treatment of combined sewer overflows (CSOs); however, the province has worked with municipalities to segregate sanitary and storm sewers. The MISA program will consider abatement requirements for CSOs. Guidelines for Snow Disposal and Deicing Operations in Ontario minimize impacts on surface and groundwaters.

The U.S.EPA Region V (Chicago) has developed a two-phased management program of CSOs under the authority of the CWA through the municipal waste treatment facility NPDES permit process. The purpose of the Region V NPDES Permit Strategy for Combined Sewer Systems is to incorporate planning and management procedures into combined sewer system operations to result in a more effective management of the system. The program initially institutes management controls on the existing combined sewer system, in an attempt to reduce receiving water impacts. If satisfactory results are not achieved, rehabilitation of the sewer system, or other more extensive steps, may be required. In addition, Michigan has drafted a CSO policy which may contain limitations much like any other point source discharge.

6. Atmospheric Deposition

Annex 15 of the GLWQA calls for research, surveillance and monitoring, and implementation of control measures to reduce atmospheric deposition of toxic substances to the Great Lakes Basin. Annex 15 also requires that measures to control emission sources which significantly contribute to pollution of the Great Lakes be studied, developed and implemented. The Memorandum of Understanding between Ontario and Michigan, recently signed, contains the Ontario-Michigan Joint Notification Plan for Unanticipated or Accidental Discharges of Airborne Pollutants, outlining steps and actions to be taken by both governments in the event of such an incident.

In Canada, National Ambient Air Quality Objectives have been established under the Canadian Clean Air Act as a guide in developing programs to reduce the damaging effects of air pollution.

These national objectives assist in establishing priorities for reducing contaminant levels and the extent of pollution control needed, provide a uniform yardstick for assessing air quality in all parts of Canada, and indicate the need for and extent of monitoring programs. CEPA, in addition to regulating point sources of air emissions, also has the authority to regulate fuel and fuel additives, which may impact on atmospheric deposition of combustion products and lead. Provincial Ambient Air Quality Criteria are developed under the Ontario Environmental Protection Act. OMOE, often in conjunction with other groups and agencies, prepares a yearly summary of transboundary air contaminant movement and conducts studies on the long range transportation and deposition of contaminants to the Great Lakes.

In the U.S., the Clean Air Act (CAA) gives authority to the U.S.EPA to approve programs affecting air quality, implemented at the state level. National Ambient Air Quality Standards (NAAQS) have been developed by the U.S.EPA, and consist of both primary and secondary standards, to protect public health and welfare, respectively. A few atmospheric nonpoint source programs have been implemented at the federal level. The CAA provides the U.S.EPA with authority to control and/or prohibit fuels and fuel additives used in motor vehicles which have been determined to endanger public health. To this end, the U.S.EPA requires registration of fuel and fuel additives, and prohibits the production or importation of gasoline containing an average lead concentration of 0.1 g lead/gallon fuel or greater. The CAA regulations stipulate emission requirements for new motor vehicles as a method of controlling air quality. Michigan manages its own air program, adopting and adhering to the federal NAAQS. Ambient air monitoring is conducted in Michigan in some industrial areas known or suspected of having significant releases of toxic air pollutants. An Air Quality Index is reported to the public daily.

7. In-place Pollutants

Article VI and Annex 7 of the GLWQA provide for the development of a Subcommittee on Dredging to review the existing practices in the U.S. and Canada relating to dredging activities, and to develop guidelines and criteria for dredging activities in boundary waters of the Great Lakes. Annex 14 of the GLWQA calls for parties to develop a standard approach and agreed upon procedures for the management of contaminated sediments.

In Canada, federal authority over contaminated sediments in the Great Lakes is limited; the province of Ontario is primarily responsible. However, under the Canada-Ontario Agreement, a Polluted Sediment Subcommittee has been formed, charged with developing a standardized assessment procedure for assessing contaminated sediments and their remedial options. Under the

Environmental Protection Act, the Ontario Minister of Environment can order the removal of contaminated sediments.

In the U.S., the Clean Water Act authorizes funds to identify areas containing contaminated sediments and to develop plans for sediment removal and disposal from critical ports and harbors. Section 404(b) of the CWA empowers the U.S. Army Corps of Engineers to issue permits to govern dredging and fill operations for the purposes of navigation. Control over the discharge of dredged and fill material at specified disposal sites is maintained through a permitting process. In some instances, contaminated sediments may be regulated under RCRA, such as in instances when dredged sediments exhibit one or more of the hazardous waste characteristics defined under RCRA, or if a release occurs at a Treatment, Storage and Disposal facility, as defined under RCRA. All dredging projects in Michigan are subject to review and certification under the CWA. Dredging permits may also be required under Michigan's Inland Lakes and Stream Acts (Act 346) and the Great Lakes Submerged Lands Act (Act 247).

E. SOLID, LIQUID AND HAZARDOUS WASTE CONTROLS

The GLWQA, in Annex 13, calls for the development of programs to abate and reduce pollution resulting from land use activities, including waste disposal sites. At the present time, no specific guidelines are developed for siting or management of solid or hazardous waste sites.

Regulations concerning the use, handling, storage and disposal of hazardous wastes in Canada are primarily developed at the provincial, rather than federal, level. Some federal statutes do, however, offer some control. The federal Environmental Contaminants Act restricts the use, handling and/or disposal of selected hazardous substances: PCB and PCB products, mirex, polychlorinated terphenyls and polybrominated biphenyls. The recent passed Canadian Environmental Protection Act (CEPA) provides control over the manufacture, transportation, use, disposal, importation and exportation of chemicals and wastes where not adequately controlled by regulation in other legislation. The federal Transportation of Dangerous Goods Act prescribes safety requirements, standards and safety marks on all means of transport across Canada, including the transport of hazardous material.

At the provincial level, solid and hazardous waste programs are regulated under the Environmental Protection Act (EPA). The EPA develops standards for siting, maintenance and operation of waste sites, and operates a paperwork manifest system to monitor the transport and handling of hazardous wastes. Under EPA, all waste sites are required to have a Certificate of Approval prior to operation. In addition, Ontario regulations prohibit deep well injection of any liquid industrial waste into the Detroit River Group geological formation in Lambton County, and prohibits the deep well injection of brines within 8 km of the St. Clair River.

In the U.S., the federal Solid Waste Disposal Act (SWDA), as amended (which includes the Resource Conservation and Recovery Act and the Hazardous and Solid Waste Amendments), develops regulations to manage solid and hazardous wastes. Three distinct programs have been developed: the Solid Waste Program, the Hazardous Waste Program and the Underground Storage Tank Program. The Solid Waste Program defines both technical and management criteria for the proper operation of a solid waste facility. The Hazardous Waste Program defines certain wastes or characteristics as "hazardous", describes the Uniform Hazardous Waste Manifest System for the tracking of hazardous waste movement, and develops requirements for generators, transporters and owner/operators of Treatment, Storage and Disposal facilities. The Underground Storage Tank program develops construction criteria, performance standards and notification requirements for underground storage tanks. Michigan has obtained primacy for most of these solid and hazardous waste programs, with regulations being developed under

Michigan Act 64 (Michigan Hazardous Waste Management Act), Act 136 (Michigan Liquid Industrial Waste Disposal Act), Act 641 (Michigan Solid Waste Management Act), Act 423 (Michigan Underground Storage Tank Act) and Act 366 (Michigan Resource Recovery Act). Michigan Act 61, referred to as the Oil and Gas Act, which generally addresses permitting, drilling, production and abandonment of production and disposal wells, specifically requires operation of the wells in such a manner as to prevent the escape of oil, gas, saltwater, brine or oil field wastes which would be damaging to fresh water resources.

The U.S. federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), colloquially referred to as "Superfund", was amended in 1986 by the Superfund Amendments and Reauthorization Act (SARA) (which contains the Emergency Planning and Community Right To Know Act of 1986 (Title III) and the Radon Gas and Indoor Air Quality Research Act of 1986 (Title IV)). CERCLA identifies an extensive list of substances as "hazardous", and authorizes the remediation of uncontrolled waste sites containing hazardous materials, involving a stepwise evaluation of the hazards present. CERCLA, sharing a dual authority with the Clean Water Act, is also concerned with uncontrolled releases of oil and hazardous materials to navigable waters to the U.S. The Michigan Environmental Response Act (Act 307) provides for the prioritization of hazardous waste sites in the state, and recommends state funds for remediation. Michigan may, through this regulation, remediate sites not being addressed by the federal Superfund program.

The U.S. Toxic Substances Control Act (TSCA) provides the U.S.EPA with broad authority over the manufacturing, importation and processing of about 63,000 chemical substances intended for commercial purposes. TSCA has effectively banned the manufacture and use of PCB and PCB products, prohibited chlorofluorocarbon use as a propellant, and has proposed a phased-in ban on the use and importation of asbestos.

Summarization

This chapter has provided an overview of existing environmental legislation and programs within the U.S. and Canadian federal governments, the State of Michigan and the Province of Ontario. Considerable legislation exists to control and influence environmental quality in the Great Lakes Basin, along with mechanisms to effect further improvements in Great Lakes ecosystem quality. Discussion of each Act or program mentioned within this chapter, along with others, is expanded upon in a more comprehensive review of regulatory programs in the Regulatory Task Force Report (1) which is included in Volume III.

F. REFERENCE

1. Regulatory Task Force Report, UGLCCS. 1988. Summarization of environmental regulations, agreements and programs in the United States, Canada, Ontario and Michigan. C. Fuller (chairperson). Final Rept June, 1988.